ANSI/ASAE S276.6 JAN2005
Slow Moving Vehicle Identification Emblem (SMV Emblem)

American Society of Agricultural Engineers

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Developed cooperatively by the ASAE Farm Safety Committee and the National Safety Council's Farm Conference Studies and Research Committee; approved by the ASAE Power and Machinery Division Technical Committee; adopted by ASAE as a Recommendation December 1964; revised and adopted as a Standard December 1966; revised March 1968; approved as an American National Standard July 1971; reconfirmed December 1973; revised December 1975; error corrected in percent peak reflectance, Table 1, June 1976; reconfirmed December 1980; revision approved by ANSI July 1984; reconfirmed December 1985; revised editorially July 1989; reconfirmed December 1990; revised editorially February 1991; reconfirmed December 1991; reaffirmed by ANSI October 1992; revised June 1993; revision approved by ANSI January 1994; revised November 1997; revision approved by ANSI May 1998; revised editorially September 1998; reaffirmed by ANSI February 2003; reaffirmed by ASAE February 2003, revised January 2005, revision approved by ANSI January 2005.

1 Introduction

Implements of husbandry/agricultural equipment and other slow moving machines, either self-propelled or towed, are often moved between operational sites that are not contiguous. Transport may involve moving on public roads (infrastructure) at ground speeds less than 40 km/h (25 mile/h). This standard provides a means of identifying such slow moving equipment to communicate to third parties traveling on such public roads as to the relative speed of such equipment to other vehicles utilizing the public roads.

2 Purpose and scope

2.1 This Standard establishes specifications that define a unique identification emblem, the Slow Moving Vehicle Emblem (SMV Emblem), to be used only for slow moving machines (vehicles), when operated or traveling on public roads. The requirements and applications of the standard are defined in the standard. The purpose is to communicate to third parties the slower speed capabilities of the slow moving vehicle to other vehicle(s) using public roads. The primary application of this SMV emblem will be with implements of husbandry but may be used with other machines or vehicles that travel at speeds less than 40 km/h (25 mile/h) and in combination with a Speed Information Symbol (SIS) on vehicles which travel at speeds between 40 km/h (25 mile/h) and 65 km/h (40 mile/h).

2.2 This Standard establishes emblem dimensional specifications, performance requirements, related test procedures, mounting requirements and applications of the emblem.

2.3 The SMV emblem shall complement but not replace warning devices such as tail lamps, reflectors, or flashing lights.

2.4 The dimensions and color patterns of the emblem have been established as a unique identification and shall not be altered to permit advertising or other markings on the face of the emblem, except as required in clause 5.2 Emblem Marking.

3 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ANSI/ASAE S277.2 FEB03, *Mounting Brackets and Socket for Warning Lamp and Slow-Moving Vehicle (SMV) Identification Emblem*

ASTM D1014-93(1999), *Method for Conducting Exterior Exposure Tests of Paints on Steel*

ASTM D2794-02, *Test Method for Resistance of Organic Coatings to the Effects of Rapid Deformation (Impact)*

ASTM D4549-00, *Specification for Polystyrene Molding and Extrusion Materials (PS)*

ASTM D4673-02, *Specification for Acrylonitrile-Butadiene-Styrene (ABS) Molding and Extrusion Materials*

ASTM D4956-01, *Standard Specification for Retroreflective Sheeting for Traffic Control*

ASTM E284-03, *Terminology of Appearance*

ASTM E308-01, *Test Method for Computing the Colors of Objects by Using the CIE System*

ASTM E991-95, *Practice for Color Measurement of Fluorescent Specimen*

ASTM E1247-92, *Standard Test Method for Identifying Fluorescence in Object-Color Specimens by Spectrophotometry*

ASTM E1349-(90)1998, *Test Method for Reflectance Factor and Color by Spectrophotometry Using Bi-Directional Geometry*

PSTC-1, *Pressure Sensitive Tape Council*

SAE J575 JUN92, *Test Methods and Equipment for Lighting Devices and Components for Use on Vehicles Less Than 2032 mm in Overall Width*

SAE J594 July 95, *Reflex Reflectors*

ASAE S390.3 JUN01, *Definitions and Classifications of Agricultural Field Equipment*

ANSI/ASAE S584 JAN2005, *Agricultural Equipment: Speed Identification Symbol (SIS)*

4 Definitions

4.1 Implement of husbandry: A vehicle or specific mobile equipment manufactured, designed or reconstructed for agricultural purposes and, except for incidental uses, primarily used in the conduct of agricultural operations. Included is agricultural equipment in mounted, semi-integral or towed configurations that are transported by the mobile equipment.

4.2 Machine (vehicular) mounted emblem: An SMV emblem as illustrated in figure 1 permanently secured to a slow moving machine (vehicle).

4.3 Movable emblem: An emblem as illustrated in figure 1 securely affixed to a backing material as illustrated in figure 2 that shall be displayed on a slow-moving machine (vehicle).

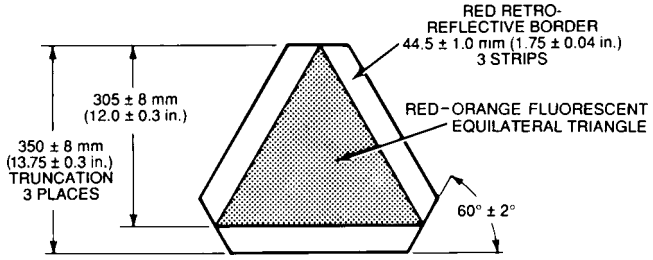

Figure 1 – Slow-moving vehicle identification emblem

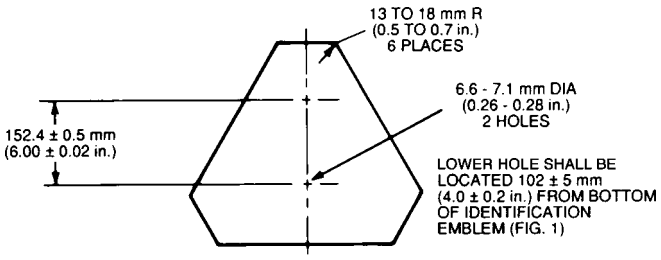

Figure 2 – Mounting material corner radius and mounting hole location

4.4 Public road (highway): The entire width between the boundary lines of every road publicly maintained when any part thereof is open to the use of the public for purposes of vehicular travel. Term includes highways not limited to trucks and cars, county and municipal roads and lanes.

4.5 Slow-moving machine (vehicle): An animal-drawn or motorized conveyance, including implements in tow, that is designed for and travels at rates of speed less than those specified in clause 7.2.

4.6 Slow Moving Vehicular Emblem: A red-orange fluorescent equilateral triangle with a red retroreflective border positioned with a point of the triangle up.

5 Description

5.1 The SMV emblem, figure 1, consists of a fluorescent, orange equilateral triangle with a red retroreflective. The red-orange fluorescent triangle provides for daylight identification. The red retroreflective border appears as a hollow red triangle in the path of motor vehicle headlights at night. The emblem may be machine mounted or movable as defined in clauses 4.2 and 4.3.

5.2 Emblem marking. The emblem manufacturer shall place the name and address of the company on the face of the SMV emblem, and shall CERTIFY that the emblem is in compliance with this Standard S276.6. This information shall be clearly and permanently marked on the face of the emblem. It shall appear only in the lower center or lower right-hand corner of the emblem. On movable emblems, the information may be located on the reverse side of the mounting material. When the information is located on the face of the emblem, it shall not include trademarks, symbols, or other types of promotional communications, and the total area used for such information on the face of the emblem shall not exceed 6.5 cm^2 (2 $in.^2$).

6 Materials, performance and test requirements

6.1 Retroreflective materials

6.1.1 Visibility.The SMV emblem shall be visible at night as a hollow red triangle from all distances between 305 and 30 m (1000 and 100 ft) from the rear when directly in front of lawful vehicle low beam headlights.

6.1.2 Dimensional requirements. The retroreflective material size shall be as shown in figure 1.

6.1.3 Construction. Retroreflective sheeting shall consist of a smooth, flat, transparent exterior film with retroreflective elements embedded or suspended beneath the film so as to form a non-exposed retroreflective optical system. A molded reflex reflector meeting the requirements of SAE 594 is acceptable.

6.1.4 Performance requirements. Retroreflective sheeting shall meet requirements of ASTM D4956 for type V sheeting except for the photometric requirements and shall meet the minimum photometric performance requirements specified in table 1. The sheeting shall meet the color specification limits in table 2. The reflex reflector shall meet the requirements of SAE 594.

Table 1 – Minimum photometric performance (candela/lux/m^2)

Observation angle, °	Entrance angle, °	Red requirements
0.2	−4	60
0.2	30	60
0.2	45	15
0.5	−4	15
0.5	30	15
0.5	45	4

Table 2 – Color specification limits (daytime)

Color	1		2		3		4	
	x	y	x	y	x	y	x	y
Red	0.613	0.297	0.708	0.292	0.636	0.364	0.558	0.352

	Daytime Luminance Luminance factor (Y%)	
Color	Min	Max
Red	3	11

6.1.5 Exterior durability. Samples mounted on backing material specified in this Standard shall be exposed to the sun for a minimum test period of 24 months outside in south Florida, or similar natural climatic conditions, at an angle of 45° to horizontal facing upward and south, per ASTM D1014. After exterior durability testing, the material shall show no cracking, crazing, blistering, loss of adhesion, or dimensional change, and shall meet the requirements in tables 1 and 2 when measured at 0.2° observation angle, and -4° entrance angle, at temperatures between 16 and 38°C (60 and 100°F) and relative humidity at 20 to 80%.

6.1.6 Corrosion resistance. Material shall show no corrosion or edge fading and meet requirements of table 1 measured at 0.2° observation angle, and -4° entrance angle in accordance with ASTM D4956, clause 8.3, after corrosion testing as specified in SAE J575, clause 3.4.

6.1.7 Adhesion. Emblem Material shall meet the adhesive requirements of ASTM D4956, clause 6.9.

6.2 Fluorescent materials

6.2.1 Visibility. The SMV emblem shall be visible in the daylight as a red-orange fluorescent triangle from all distances between 305 and 30 m (1000 and 100 ft).

6.2.2 Dimensional requirements. The fluorescent triangle size shall be as shown in figure 1.

6.2.3 Construction. The fluorescent materials shall be of sufficient thickness and strength and toughness to meet the requirements of clause 6.2.5.

6.2.4 Performance requirements. The red-orange color, purity, luminance, and peak reflectance of the fluorescent material shall comply with specifications of table 3 before and after the durability test.

6.2.5 Exterior durability. Samples mounted on mounting material specified in 6.3.2 shall be exposed to the sun for a minimum test period of 24 months outside in south Florida, or similar natural climatic conditions, at an angle of 45° to horizontal facing upward and south, per ASTM D1014. After the durability test, the emblem material shall show no cracking, crazing, blistering, loss of adhesion, or dimensional change, and shall meet the requirements set forth in this Standard.

6.2.6 Color measurement. The spectrophotomectric color values of the fluorescent material shall be determined by using a colorimetric spectrophotometer conforming to the requirements of ASTM E991. Luminance shall be compared to that of a NIST (National Institute of Standards and Testing) defined perfect reflecting diffuser (PRD) for CIE (Color Institute) illumant D65. As these fluorescent identification emblems can be expected to be viewed with an angular subtend of <4° at the eye,

it is recommended that the CIE *XYZ* values be calculated using the CIE 1931 (2°) standard observer and CIE illuminant D65. The CIE chromaticity coordinates, *X* and *Y*, shall be calculated as given below and defined in clause 7.4 of ASTM E308.

$$\text{CIE } Y = \text{CIE } Y$$

$$x = \frac{X}{X + Y + Z \text{ CIE}} \qquad y = \frac{Y}{X + Y + Z \text{ CIE}}$$

For example, given CIE $X = 37.87$, $Y = 34.05$, and $Z = 32.18$ for 2° D65 conditions, luminance factor $Y = 34.05$, chromaticity values are $x = 0.3638$ and $y = 0.3271$. The dominant wavelength and purity shall be determined using *x* and *y* from CIE diagrams. The values of *Y* shall be the luminance factor recorded as percent (luminance, %). From the spectral reflectance data, the maximum reflectance shall be no lower than the values shown in table 3.

Table 3 – Fluorescent values

	Before exposure test	After exposure test
Dominant wavelength, nm	602–610	585 min
Purity, %	84 min	77 min
Luminance, %	28 min	50 max
Peak reflectance observable at wavelength nearest dominant, %	over 100	75 min

6.2.7 Adhesion. Material shall be applied with a pressure sensitive adhesive having a minimum adhesive value of 3.6 kg/cm (50 oz/in.) width, when pulled at the rate of 30.5 cm/min (12 in./min) at 180° angle. Adhesion test shall be performed as specified in PSTC-1.

6.3 Mounting material for movable emblems

6.3.1 Dimensional requirements. The mounting material size shall be as shown in figure 1, with corner radius and mounting holes as shown in figure 2, for use as a movable emblem with the mounting brackets specified in ANSI/ANSE S277.2.

6.3.2 Construction. Mounting material for movable identification emblems shall be equivalent to 1.0 mm (0.04 in.) minimum thickness aluminum; 22 gage 0.8 mm (0.03 in.) minimum thickness mill-galvanized coated sheet steel; or 2.0 mm (0.08 in.) minimum thickness ABS plastic as specified in ASTM D4673 or 2.0 mm (0.08 in.) high impact polystyrene plastic as specified in ASTM D4549. The edges of the backing material shall be shaped to minimize personal injury during handling and when mounted on a slow-moving vehicle.

6.3.3 Exterior durability. The mounting material shall be weatherable, semirigid, and have a surface receptive to a durable bond.

6.3.4 Drop test. A movable emblem shall be dropped from a height of 1.8 m (6 ft) to a smooth, hard surface equivalent to rigid metal or concrete. Each movable emblem shall be submitted to three drop tests; corner drop, edge drop, and flat face surface drop. Failure shall be considered to have occurred when the emblem or the backing material will no longer meet the requirements of this Standard. The drop test shall be conducted at both 24 °C (75 °F) and -23 °C (-10 °F).

6.3.5 Impact resistance. This test procedure provides the means of determining the force required to fracture backing material by a free-falling impact hammer dropped vertically. The impact hammer shall be 15,88 mm (0.625 in.) diameter and have a 15.88 mm (0.625 in.) nose radius. The base shall be 31.8 mm (1.25 in.) diameter. The test specimen shall be a minimum of 102 mm (4 in.) square. Test conditions shall be at room temperature of 24±2°C (75±3°F), and failure shall be evidence of fracture or rupture of the backing material (see ASTM D2794).

6.4 All of these requirements are minimal and do not preclude the use of materials having superior performance.

7 Positioning and Applicaiton

7.1 Position of emblem

7.1.1 The emblem shall be mounted with the point of the triangle upward (figure 3).

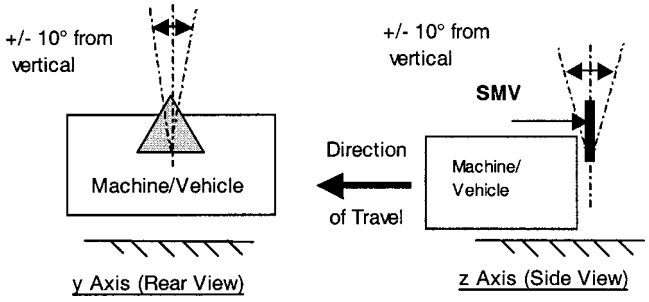

Figure 3 – Slow Moving Vehicle Emblem mounting tolerances

7.1.2 Emblems shall be mounted with the point of the triangle with a±10 degrees of vertical (y axis) tolerance, and a plane perpendicular to the direction of travel within ±10° (z axis), figure 3 when the machine is in the tranport position.

7.1.3 The emblem shall be displayed as near to the rear and centered, or as near to the left of center of the vehicle or equipment as practical. It shall be located 0.6 to 3 m (2 to 10 ft) above the ground measured from the lower edge of the emblem.

7.1.4 The emblem shall be securely and rigidly affixed to the equipment. Movable emblems may be mounted by using the socket and bracket specified in ANSI/ASAE S277, or by other means that provide secure and rigid attachment.

7.1.5 The effective retroreflectivity and fluorescence of the emblem shall be unobscured to the extent that the triangular shape is readily identifiable both day and night.

7.2 Application of SMV emblem

7.2.1 This SMV emblem shall be used only on slow moving machines (vehicles).

7.2.1.1 On slow moving machines (vehicles) with design specifications of a maximum speed of 40 km/h (25 mile/h) or less, the SMV emblem shall be used.

7.2.1.2 On slow moving machines (vehicles) with design specifications of speed greater than 40 km/h (25 mile/h) but not exceeding 65 km/h (40 mile/h):

1) a SMV emblem shall be used
AND
2) a Speed Identification Symbol (SIS) shall be used.

7.2.2 The SMV emblem shall not be used to identify objects that are permanently stationary.

7.2.3 The SMV emblem shall be removed or covered when being transported at speeds other than those described in section 7.2.1.1 and 7.2.1.2.

7.2.4 The speed that a slow moving machine (vehicle) shall travel is that specified in the operator's manual, instructions or information sign, or the limit of the road conditions, whichever is the lesser for the machine, or any combination of slow moving machines (vehicles) including combinations of towed equipment.

7.2.5 All slow moving self-propelled and towed equipment shall have a SMV emblem mounted on the machnine if conveyed in a public road. Integral equipment that will obscure any portion of the SMV emblem of the machine on which it is mounted when transported, shall have it's own SMV emblem.